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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/805,118	03/19/2004	Vishnu K. Agarwal	501082.18 (30051/US/17)	8507

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EXAMINER	
FENTY, JESSE A	

ART UNIT	PAPER NUMBER
2815	

DATE MAILED: 09/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/805,118	AGARWAL, VISHNU K.	
	Examiner	Art Unit	
	Jesse A. Fenty	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *19 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *73-99* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *88-94* is/are allowed.

6)☒ Claim(s) *73-78,80-85,87 and 95-99* is/are rejected.

7)☒ Claim(s) *79 and 86* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/19/4*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 75 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

a. The specification does not disclose the nitrogen-stuffed surface contacting an oxygen molecule.

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 76, 77 and 95-99 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

b. Claim 76 recites the limitation "the carbon-silicon compound" in lines 1 and 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

c. Claim 77 recites the limitation "the other conductive layer" in lines 1 and 2 of the claim. There is insufficient antecedent basis for this limitation in the claim.

d. Claim 95 recites the limitation "the metal layer" in line 5 of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 73, 74 and 80 are rejected under 35 U.S.C. 102(e) as being anticipated by Mak et al. (U.S. Patent No. 6,162,715).

In re claim 73, Mak discloses an in-process device, comprising:

A substrate (2);

A conductive layer (8) over said substrate and having a surface stuffed with a non-oxygen material (column 10, lines 41-67).

In re claim 74, Mak discloses the device of claim 73, wherein said surface is a nitrogen-stuffed surface (contains N_2H_2 plasma; column 10, line 48).

In re claim 80, Mak discloses the device of claim 73, wherein the substrate comprises a silicon substrate (column 4, lines 31-32).

3. Claims 81, 85 and 87 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al. (U.S. Patent No. 6,077,742).

In re claim 81, Chen (Fig. 2) discloses an in-process device, comprising:

A substrate (10); and

A passivated conductive layer (24) over the substrate, the passivated conductive layer having a reduced ability to associate with oxygen by being exposed to a material selected from phosphine (column 6, lines 54-58).

In re claim 85, Chen discloses the in-process device of claim 81, further comprising a second conductive layer (26) formed on the conductive layer and a third conductive layer (46) formed on the second conductive layer.

In re claim 87, Chen discloses the in-process device of claim 81, wherein the substrate comprises a silicon substrate (column 5, lines 34-35).

4. Claims 81-84 and 87 are rejected under 35 U.S.C. 102(e) as being anticipated by Sung (U.S. Patent No. 5,858,831).

In re claim 81, Sung (Figs. 19 and 20) discloses an in-process device, comprising:

A substrate (1); and

A passivated conductive layer (39) over the substrate, the passivated conductive layer having a reduced ability to associate with oxygen by being exposed to a material selected from phosphine (column 8, lines 12-13).

In re claim 82, Sung discloses the device of claim 81, wherein the conductive layer comprises tungsten nitride (column 8, lines 15-16).

In re claim 83, Sung discloses the device of claim 82, further comprising another conductive layer (44).

In re claim 84, Sung discloses the device of claim 83, wherein the other conductive layer comprises copper (column 8, lines 36-42).

In re claim 87, Sung discloses the device of claim 81, wherein the substrate comprises a silicon substrate (column 3, line 43).

In re claims 95 and 99, as best understood, are rejected under 35 U.S.C. 102(e) as being anticipated by Chen et al. (as above).

In re claim 95, Chen (Fig. 2) discloses an in-process device, comprising:

A substrate (10);

A first conductive layer (24) disposed on the substrate and exposed to an oxygen-inhibiting material phosphine (column 6, lines 54-58);

A second conductive layer (26) disposed on the first conductive layer; and

A third conductive layer (46) disposed on the second conductive layer.

In re claim 99, Chen discloses the in-process device of claim 95, wherein the substrate comprises a silicon substrate (column 5, lines 34-35).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claim 78 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mak as applied to claim 73 above, and further in view of Sanchez (U.S. Patent No. 6,081,010).

In re claim 78, Mak discloses the device of claim 73, further comprising a second conductive layer (9, Gate) on the conductive layer, but does not expressly disclose a third conductive layer on the second conductive layer. Sanchez (Fig. 3) discloses a third conductive layer (34c, Silicide) atop the tungsten gate layer (22). It would have been obvious for one skilled in the art at the time of the invention to form a silicide layer as disclosed by Sanchez atop the tungsten gate of Mak for the purpose, for example, of improving the transistor performance by reducing the contact resistance (Sanchez; column 5, lines 15-20).

7. Claims 95-99, as best understood, are rejected under 35 U.S.C. 103(a) as being unpatentable over Sung (as above) in view of Chen et al. (as above).

In re claim 95, Sung (Fig. 2) discloses an in-process device, comprising:

A substrate (1);

A first conductive layer (39) disposed on the substrate and exposed to an oxygen-inhibiting material phosphine (column , lines 12-13); and

A second conductive layer (44) disposed on the first conductive layer.

Sung does not expressly disclose a third conductive layer disposed on the second conductive layer. Chen disclose a third conductive connection layer (48) disposed on copper plugs (46). It would have been obvious to one of ordinary skill in the art at the time of the invention to use a connection layer as disclosed by Chen for the device of Sung for the purpose,

for example, of enhancing the functionality of the device by connecting the conductive plugs to other areas of the semiconductor device.

In re claim 96 Sung in view of Chen discloses the device of claim 95, wherein the first conductive layer (39) comprises tungsten nitride (Sung; column 8, lines 15-16).

In re claim 97, Sung in view of Chen discloses the device of claim 96, comprising another conductive layer (44) on the tungsten nitride layer.

In re claim 98, Sung in view of Chen discloses the device of claim 97, wherein the another conductive layer comprises copper (column 8, lines 36-42).

In re claim 99, Sung in view of Chen discloses the device of claim 95, wherein the substrate comprises a silicon substrate (column 3, line 43).

Allowable Subject Matter

8. Claims 79 and 86 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. Claims 88-94 are allowed.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jesse A. Fenty whose telephone number is 571-272-1729. The examiner can normally be reached on 5/4-9 1st Fri. Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 571-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jesse A. Fenty
Examiner
Art Unit 2815